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ABSTRACT

This publication summarizes ideas and outcomes of the first-ever symposium on capital renewal and deferred maintenance (CRDM) at New Mexico public institutions of higher education. A preface by Donald L. Mackel of the University of New Mexico reviews state policy concerning facility maintenance responsibilities and the university's CRDM status. Chapter 1 briefly reviews the past 40 years of studies on the importance of CRDM issues. Chapter 2 reviews the symposium organization. Chapter 3 offers definitions for key terms and discusses benchmarks, standards, and the facilities audit. Chapter 4 describes two planning models for long-term management of CRDM: the deferred maintenance funding and backlog model using the facilities renewal resource model at the University of California as a case study of the latter. Chapter 5 addresses issues of financing capital renewal and identifies six strategies for funding CRDM, such as direct appropriations, bond or debt financing, and special student fees. Chapter 6 summarizes participants views concerning the challenges of stewardship, the costs of ownership, policy and funding implications, and the nature of the planning process. Chapter 7 offers strategies for addressing CRDM problems and for developing new policies, and summarizes some lessons learned about the collaboration process. (Contains 48 references.) (DB)

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CHARTING A NEW COURSE FOR CAMPUS RENEWAL

ROD ROSE

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Charting a New Course for Campus Renewal

Lessons from the New Mexico Higher Education Symposium on Capital Renewal and Deferred Maintenance

Rod Rose

The Association of Higher Education Facilities Officers

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APPA was most pleased to help sponsor and participate in the Symposium for New Mexico Higher Education: Successful Planning for Capital Renewal and Deferred Maintenance. And we are proud to publish this summary report from the program for the benefit of a broader audience of facilities professionals at educational institutions. Author Rod Rose deserves our kudos for recording and synthesizing the many valuable points made at the symposium. He attended the two-day symposium, took voluminous notes, reviewed the eight hours of videotape taken at the program, and conducted interviews with speakers and participants. We thank him for his efforts.

APPA also expresses its sincere appreciation to the colleagues and professional facilities managers who gave their time to participate in and were essential to the success of the symposium. First and foremost among them is Donald L. Mackel, director of physical plant at the University of New Mexico and past APPA President. Don had the vision for the symposium and its potential impact on the colleges and universities of New Mexico and elsewhere. He brought together an array of tremendous talent in all aspects of facilities management and higher education administration. We thank Don and the following individuals for their contributions to the symposium and, ultimately, this publication.

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About the Author

Rod Rose is vice president of The JCM Group, Inc., a consulting and project management firm working to define solutions for complex organizational and facilities problems for public and private institutions.

He is a frequent speaker at regional and national conferences, and conducts planning workshops and seminars for education, government, and corporate administrators, and Boards of Trustees. He is currently the executive editor of *Planning for Higher Education*, the professional journal of the Society for College and University Planning. ■

Preface

As the institutions of higher education in New Mexico await the final legislative action for the current year's session, we look back on a very productive year with a great deal of satisfaction and sense of accomplishment. My central motivation for organizing and hosting the first-ever Symposium for New Mexico Higher Education: Successful Planning for Capital Renewal and Deferred Maintenance was a desire to improve a system that has become markedly out of balance.

The institutions of higher education in New Mexico have received increased funding for materials, supplies, and services in only one of the past 13 years. In the same period, inflation has increased 48.6 percent. The loss of real purchasing power has been staggering. The state legislature has implemented a formula for funding building renewal and renovation for its 25 higher education institutions and two special schools. Only in the most recent years have such major capital asset components such as utilities infrastructure, telecommunications, landscape, or hardscape been included in the formula. However, those components remain unfunded. The formula is not perfect, but it remains a reasonable one.

The growth at the University of New Mexico has been much like that of most institutions across the United States. The demands of our academic programs, access requirements, and the unfunded mandates that address the public safety have overwhelmed our institution's and state's ability to keep up with the needs. As a consequence, a staggering backlog of capital renewal and deferred maintenance (CRDM) has developed.

The symposium that you will read about here was my attempt at gaining the attention of our institutional leaders and that of our state governing bodies. Further, it was an attempt to communicate to them the growing seriousness of the problem and, in a collective, collaborative way with our colleagues, to find meaningful and workable solutions. It is one strategy. I'd like to share some of our accomplishments with you.

Shortly after completion of the symposium on April 10, 1998, Miguel Hidalgo of the Commission on Higher Education and Harvey Chace and I of the University of New Mexico were invited to address the entire New Mexico CHE at its June 1998 meeting about CRDM at the New Mexico institutions as well as the recent symposium initiatives. On the agenda for the Commission's consideration was a draft policy called "Policy for Public Investment In Higher Education," which had been under review for roughly six months.

The policy directs that before the institutions ask the CHE to advocate capital requests for new structures, all other options must be rigorously considered. The policy is clearly focused on the issue of new construction versus renewal of existing facilities and clearly established the notion of funding for renewal and replacement as critical to successful facilities asset management. Further, it estab-

lishes that when the decisions are made to add facilities to a campus inventory, it must be recognized as a long-term fiscal responsibility, not just for the initial construction costs.

This is a farsighted and publicly responsible position for the Commission to take. Dr. Thomas Gale, the current chair of the Commission's Capital Projects Committee, had attended and actively participated in the symposium. His introductory remarks included the following, "This symposium was absolutely vital to the future of higher education in New Mexico. It will have an impact on all future recommendations of this commission." The policy passed without opposition.

Also in June 1998, Harvey Chace and I were invited to address UNM's Board of Regents to review the symposium initiatives and brief them on the university's CRDM status. This was our very first opportunity to bring this information to the attention of the Regents. Less than a week later we were invited to make the case for CRDM funding to the New Mexico Legislative Finance Committee, which was very receptive to our presentation and indicated that they could be highly supportive of initiatives and a financial plan to address the issue of CRDM that would make the institutions accountable. The Legislative Finance Committee Chairman, Honorable Max Coll, stated that "It may be time for us to revisit the law that establishes the cap on our general obligation bonding capacity for higher education."

At this juncture, we set out immediately to bring together representatives from institutions across the geographical expanses of the fourth largest state as well as from the institutional types to form a CRDM task force whose goals were to address the issue of accountability as raised by the Legislative Finance Committee. It was the group's consensus that the most important thing we could do was to devise a consistent methodology through which we could acquire reliable cost data about the current backlog of CRDM at all 27 institutions. This would enable us to report to the legislature the magnitude of the CRDM problem statewide, and provide a structure for the development of a prioritization scheme at the institution level. The task force has met each month to pursue the above goals. The plan developed was to hire a consultant to accomplish a partial or sample facilities condition audit on each campus that could be used to reliably identify the magnitude of the problem on each campus. The consultant would also provide methodology and training with which to each campus to keep the data updated.

The task force developed the request for proposal (RFP) for procurement of the facilities condition audits, then reported back to the CHE in November 1998. The plan is to pay for the audits on all 27 campuses from a portion of the proceeds of a 1998 general obligation bond for infrastructure projects. This plan will move forward and the RFP released as soon as the Attorney General rules on the appropriateness of the allocation of funds for the purpose of the facilities condition audit.

In December 1998, UNM's Harvey Chace and Ben Woods gave an update to all the institution's representatives on the

progress of the CRDM task force. The group was composed of essentially the same facilities, business, and finance people who had been in attendance at the symposium eight months earlier. Support for the project was very high.

Dr. Thomas Gale, chairman of the CHE Capital Projects Committee, announced that the CHE would be requesting the legislature to increase the level of formula funding. The formula has been consistently funded at 23 percent; the requested increase will boost the funding level to 38 percent of the formula. It is difficult to comprehend why the legislature would establish the formula acknowledging its appropriate basic level of stewardship responsibility, then to provide funding at only 23 percent. There is no question, however, that an increase of 65 percent is a major improvement to the status quo.

During the 1999 legislative session, Honorable Raymond G. Sanchez, New Mexico's Speaker of the House, enthusiastically introduced HB 139 requesting $25 million for infrastructure renovation and expansion for higher education. Representative Pauline K. Gubbels introduced HB 487 for Governor Gary Johnson. This was a historical precedent. Never before has a governor requested money for infrastructure needs at New Mexico's institutions of higher education.

There is $37 million potentially available for infrastructure and CRDM work at New Mexico's higher education institutions this year. Consider that only as far back as 1997, there were no capital projects allocations available for "infrastructure" or "CRDM" beyond the formula funded at only 23 percent. In 1998, there were allocations from a State Severance Tax Bond of $3.8 million and $13 million in General Obligation Bonds. At this writing, the final funding action is yet unknown.

In these efforts, I would like to acknowledge the outstanding work of Harvey Chace. His work and presentations during the symposium were critical in helping to bring the concepts and methodologies introduced by our out-of-state colleagues into a New Mexico context. In all of the follow-up activities—including the presentations to the CHE, Regents, LFC, and the CRDM statewide task force—Harvey, Ben Woods of New Mexico State University, Miguel Hidalgo of New Mexico's CHE, and Joe Galon of New Mexico Institute of Mining and Technology have played key roles with their excellent presentation and leadership skills.

These are major accomplishments derived, I believe, from the concerted effort of a group united in a common goal. It started with a symposium aimed at finding ways to inform and develop solutions to our common problems. In a nutshell, to improve the way in which higher education and the State of New Mexico are managing the growing backlog of deferred maintenance. From our network of professionals we were able to bring together a group of highly informed and credible associates. They were able to build consensus and momentum among the stakeholders to take ownership and address the challenges of CRDM in a collaborative way.

Donald L. Mackel
University of New Mexico

Chapter 1—
CRDM in Sharp Focus

The water line in the north tunnel fractured shortly after lunch. The line provided the only backup water service to the hospital at the University of New Mexico (UNM). Physical Plant Director Don Mackel was attending an afternoon meeting when the associate director, Jim Rawls, slipped in a rear door and passed him a hastily written note.

A crew had been immediately dispatched to the site and was assessing the damage. But it would be difficult. Access to the tunnel containing the water line meant digging a trench to work around electrical conduits that blocked access to the line. Don would be kept informed as soon as there was news.

Later in the afternoon, Don checked on the progress of the work. Satisfied that he could not do more to help, he went back to his office to attend to last-minute details for a conference he was hosting in six days. On April 9 and 10, 1998, 106 people representing all of the state's 25 public colleges and universities and two special schools would be gathering at Albuquerque's Crowne Plaza Hotel for this first-ever symposium on capital renewal and deferred maintenance (CRDM).

Don had been thinking about the need for such a conference for several years. Rarely do the colleges' representatives converge for any reason. New Mexico is a largely rural state, and its small towns are hundreds of miles apart. The institutions are vastly different in size and character, but the issue of deteriorating infrastructure and growing deferred maintenance backlog is common to each of them—as it is on nearly every college campus. How to solve this problem was an issue they needed to talk about. Don had little trouble convincing the New Mexico Commission on Higher Education to cosponsor the symposium. APPA: The Association for Higher Education Facilities Officers and the Koch Financial Corporation signed on as sponsors as well.

At 3:30 on Saturday morning, the shrill sound of the telephone woke Don Mackel from a sound sleep. A second water line had broken. Three out of seven electrical feeders had shorted out as the water level rose, finally reaching steam lines. The 60-degree water met headlong with 260-degree steam, causing an immediate explosion. The steam lines were torn loose, parts of the tunnel structure collapsed, and expansion joints disintegrated. A disaster had occurred.

The temperatures in the tunnel, a saturated steam environment, were so high that nobody could get near the water line for nearly 12 hours. Six hours were

It was somewhat fortuitous that a crisis resulting from deferred maintenance occurred only days before a major conference on this topic.

needed just to dig a new access tunnel to get into the area. A pump weighing more than 500 pounds had to be maneuvered through an opening 5 feet long by 14 inches wide to remove the water. More than 100,000 gallons of water, including 36,000 gallons of mud and gravel, were pumped out over 48 hours. It took an additional 36 hours before electricity could be restored to much of the campus and 52 hours to restore water. The north campus was closed for three days, and the cost and time needed to repair the damage was unknown. Even worse, losses to valuable research experiments affected by the breakdown would not be known for months.

However, the cause of the initial fracture was discovered rather quickly. A 3/4-inch bolt had rusted through, allowing the pipe connection to expand and water to fill the 6-foot-by-8-foot tunnel throughout its 1/4-mile length. Cost of the bolt: less than a dollar!

The Power of a Crisis

There is an old adage: the squeaky wheel gets oiled. Another is that it takes a crisis to force change. It was, in a sardonic sort of way, somewhat fortuitous that a catastrophic event, resulting from neglected or deferred maintenance, occurred on campus only a few days before a major conference on this topic. Hollywood film makers could not have arranged a more auspicious beginning. Television crews and newspapers covered the event thoroughly, reporting on the progress of repairs, extent of damage, and the difficulty of working in terrible conditions 24 hours a day until service could be restored to the UNM north campus, which includes the University Health Sciences Center.

This was the fourth major breakdown in the past year. In the summer of 1997, the city accidentally cut off the hospital's water supply. Although the campus provided a backup supply, the pressure was too low, and water could not be provided above the fifth floor. Three floors had to be evacuated and patients treated at other facilities. In November, heat exchangers in a residence hall and a classroom building went down. Three weeks shipping time were required to replace them in severe winter conditions. And earlier in the spring of 1998, a major power outage occurred at the football stadium. Fortunately, the outage occurred three days *after* a night time Rolling Stones concert filled the stadium to overflowing.

The media covered the opening session of the New Mexico Higher Education Symposium, which included members of the state legislature and representatives of the Governor's office among its participants. At the very least, the reason for hosting such a conference—to understand and develop strategies for addressing the increasing problem of capital renewal and deferred maintenance—had suddenly and dramatically become crystal clear.

40 Years of Studies

The need to pay serious attention to the capital renewal and replacement needs of America's educational enterprises is not a new phenomenon. And it is not unique to college campuses here or in other countries. Cities, towns, and communities all over the world face exactly the same

problem. Building more facilities to accommodate a growing population and demand for buildings and supporting infrastructure automatically translates into the need to maintain and preserve the constructed environment. Yet, far more attention and resources are devoted to new development, buildings, and communities to accommodate growth than are invested in protecting what we have.

Even so, higher education institutions in the United States have been among the first to recognize their long-term responsibility to preserve their campuses and their investment in facilities. Unlike private businesses that view their facilities as depreciable assets, directly chargeable to return on investment, the physical environment for colleges and universities is an integral, inseparable part of the educational experience—just as important—in fact, mission critical—to the conduct of instruction, research, and other activities that take place in their buildings. This concern, however, has not been enough to generate the resources necessary to reduce unacceptably high levels of deferred maintenance and deteriorating infrastructure, in spite of nearly four decades of articles and studies on various aspects of the topic.

The first comprehensive study to address this issue was published in 1989 by APPA, the National Association of College and University Business Officers (NACUBO), and the prestigious consulting firm, Coopers & Lybrand. *The Decaying American Campus: A Ticking Time Bomb* chronicled the condition of college and university campuses since the 1950s, the beginning of the steep increase in college enrollments, and the equally dramatic building boom for new campuses. The study's principal findings revealed the following:

- Between 1950 and 1989, college and university facilities—including classrooms, laboratories, residence halls—quintupled to more than 3 billion gross square feet.

- The current replacement value (CRV)—the amount needed to reconstruct those facilities—was estimated at $300 billion, with current renewal and replacement needs estimated at $60 billion, $20 billion of which was considered urgent.

- The aging and deterioration of college facilities is a permanent, ongoing problem. Solving it is essential for effective teaching, research, and public service. Facility reinvestment has not kept up with the campuses' needs.

In addition to summarizing research data that included type of institution, category of facility, fund sources, definitions, and cost estimates, *The Decaying American Campus* provided a comprehensive bibliography of related books, articles, and studies.

Seven years later, in 1996, APPA published *A Foundation to Uphold.* Cosponsored by NACUBO and Sallie Mae, this study of facilities conditions at U.S. colleges and universities was written by Harvey H. Kaiser, with an extensive research report prepared by Jerry S. Davis, director of education and student loan research at Sallie Mae. The researchers analyzed the type and amount of owned and leased facilities for various

classifications of colleges and universities, the amount and cost of new construction compared to renovated space, and the costs of accumulated deferred maintenance. Major findings of the study included:

- While private business views their physical assets in terms of return on investment, government and institutions need to share the role of *stewardship*, the short-term and long-term management of facilities that are public trust.

- Accumulated deferred maintenance, estimated at $26 billion, threatens the ability of colleges and universities to carry out their missions, and will continue to grow. To that number must be added the cost of maintaining and replacing the infrastructure.

- Leaders of educational institutions must initiate strategic facilities planning, which should include dependable funding sources for capital reinvestment.

- Consistent data collection and measurement indicators, such as Facilities Condition Index (FCI) and Deferred Maintenance Ratio (DMR), are important to ensure comparability and consistency in evaluating the extent of need and developing strategies to reduce or eliminate deferred maintenance.

In 1997, APPA published *Successful Funding Strategies for Facility Renewal*, a collection of case studies of higher education institutions and a public school district that have developed innovative approaches to funding capital renewal and deferred maintenance. Author Matthew C. Adams identified five key common characteristics of these success stories:

- a credible process for evaluating or assessing deferred maintenance and renewal needs;

- the development of key stakeholder support at all levels for addressing the problem;

- the identification of feasible funding or financing alternatives;

- development of a clear implementation strategy; and

- ongoing monitoring and management of the process.

Lessons of Collaboration

Carefully documented research is absolutely critical to fully understand the nature of any problem and to explore alternative solutions. The collection and analysis of data that is gleaned from these studies—along with the references cited—should emphasize the critical nature and subsequent effects of capital renewal and deferred maintenance on our college campuses. The problem, of course, is that it takes more than research and studies to initiate change. While a crisis such as the major breakdown at the University of New Mexico is not the preferred mechanism to bring attention and, preferably, real action to address a serious problem, it tends to work. After all, how many serious accidents have to occur at a dangerous intersection before the public works department will install a traffic signal?

The value of the New Mexico Symposium is not found in the crisis that preceded it, but in the quality of the resulting discussions and the strategic initiatives. The collaboration and exchange of ideas and experiences from the more than 100 people gathered at the Crowne Plaza Hotel in April 1998 enabled the symposium to serve as a mechanism to create real change: the development of a clear consensus on specific initiatives to address one of the most serious problems facing higher education institutions in North America—capital renewal and deferred maintenance.

This book is not intended to merely summarize or document the proceedings of an informative and interesting conference. The New Mexico Higher Education Symposium on Capital Renewal and Deferred Maintenance was the first major conference held in the United States on this topic. Moreover, it was the first time that all colleges and universities in a state have convened to discuss how they can work together to address the critical issue of long-term preservation of their capital assets. It was also the first such conference that has involved not only institutional representatives from a variety of disciplines, but legislative members, representatives of the Governor's office, and a higher education coordinating commission as well.

The planning models and initiatives outlined in the symposium presentations and small group discussions became the framework for new policies, funding approaches, and strategic initiatives that are now being implemented in New Mexico. They are based on the positive experiences of universities in many other states and incorporate the analysis of data, planning processes, and the results of numerous and exhaustive studies. The lessons learned from this unique collaboration in one state can, hopefully, be adopted by other colleges and universities, or state agencies responsible for higher education planning, to preserve the physical assets that play such a permanent role in the educational mission. ■

Chapter 2—
Context

Why a Symposium?

It takes a lot of initiative to successfully organize any major conference. However, convincing political and educational leaders from throughout the state to attend a two-day meeting—with middle management and front-line staff primarily responsible for operations and planning—requires a significant focal point, a high profile issue, and an extraordinary amount of "chutzpah." In New Mexico, Don Mackel was the right person for the job.

Don grew up in New Mexico and received a B.S. in Architecture and a M.B.A. from the University of New Mexico. He joined the university physical plant department staff in 1968 while still a graduate student. He was promoted to assistant director of physical plant in 1973 and quickly became interested and involved in all facets of university administration. Even before assuming the director position in 1992, Don had developed strong relationships with the faculty, deans, and department chairs, as well as the university's administration. He had a reputation on campus for being a solid administrator, and was well liked by colleagues and staff.

Believing it was critical to understand the role of facilities management at other colleges and universities, Don joined APPA in 1970 and has remained one its most active members, serving as president in 1992-93. He was a stakeholder in the APPA-sponsored studies of deferred maintenance, and visited dozens of college campuses in the United States and other countries. The strong professional relationships that he developed at UNM and around the world showcased his ability to entice key individuals to participate in the symposium in Albuquerque.

Like most U.S. colleges, the University of New Mexico has experienced burgeoning enrollment and expansion of the physical plant to accommodate academic programs, student services, residential and athletic facilities, and a major teaching hospital. UNM is an attractive campus, its Southwest-style adobe architecture blended with intelligently planned tree-lined walkways, patios, and bridges. UNM is New Mexico's premier research university, and its faculty have excellent reputations in a myriad of disciplines. Legislators, community leaders, and parents of prospective students enjoy visiting the campus. It looks like, and very much is, an idyllic setting for a college education. Underneath the surface, however, are the much less visible signs of wear and tear that, without careful and continuing attention, can undermine the entire educational enterprise.

Every educational enterprise in the state shared this problem. And because they shared the problem, they should also be part of the solution—the idea for a symposium was born.

Like other universities, UNM has found it difficult to get resources for deferred maintenance and capital renewal. Although funds are budgeted annually for maintenance and operations, the costs usually exceed the funds available, and the backlog of deferred maintenance continued to grow. It is almost always easier to find money for new projects, new research, or an expanded student body. And because physical plants continue to operate despite such expansion, maintenance and replacement of systems that have exceeded their expected lifetime continue to be deferred.

Don Mackel recognized, however, that after years of reports, studies, and repeated requests for budget increases, a different approach was needed to seriously address the problem of underfunded deferred maintenance. Furthermore, the University of New Mexico was not the only priority for state funds. Every educational enterprise in the state, including the public school systems, shared this problem. And because they all shared the problem, they should also all be part of the solution. The idea for a symposium was born.

Organizing for Success

Most of us attend dozens, sometimes hundreds, of meetings in a single year—many of them completely forgettable. Organizing and conducting a successful meeting is almost an art form. The recipe for success requires a number of key ingredients:

- Agenda—the purpose of the meeting and issues to be discussed
- Participants—who they are and the roles they are expected to play in the meeting
- *Facilitation*—how the meeting is conducted to encourage interaction of the participants
- *Recording*—documenting key issues and follow-up actions
- *Evaluation*—monitoring initiatives or recommendations resulting from the discussions

Meetings take a lot of time to plan and are frequently expensive, especially when adding the cost of travel, hotel, meals, materials, A/V costs, speaker fees, and off-site support staff. If this symposium was to be successful, the key ingredients would have to be carefully integrated. It would not be sufficient merely to invite speakers representing a variety of institutions to relate their own experiences, citing common issues and concerns and calling for action. Nor should it be a forum for representatives of New Mexico colleges and universities to air their pent-up grievances about decades of neglect, hoping that their institutions' leaders would be motivated to provide more money. And it would be inappropriate for the University of New Mexico to be seen as organizing and using the symposium to advance its own interests. To do so could exacerbate the sensitivities of smaller institutions that may already feel intimidated by UNM's ability to leverage more resources in the educational hierarchy of New Mexico.

So the goals and the structure of the symposium were carefully planned and com-

municated to all invited participants well in advance:

1. The primary goal of the symposium was to develop *collaborative strategies* to address the problem of capital renewal and deferred maintenance, including the following questions:

   - How can we do a better job of communicating within our institutions and with the state legislature about the condition of campus facilities and the magnitude of the problem?
   - How can the existing funding formula be improved?
   - How can we develop an acceptable financial plan that effectively addresses the challenges of CRDM?

2. Participants would represent a variety of institutions and a mix of functional responsibilities within those institutions, including institutional planning and budget, design and construction, academic administration, and facilities operations. Therefore, a discussion of successful planning models would serve as a baseline of information, providing all participants with a common understanding of the issues.

3. Initiatives or recommendations from the symposium would be followed up at both institutional and statewide levels.

4. Documentation and publication of the symposium could serve as a process model for other states.

If these goals could be achieved through this two-day meeting, the symposium would be a success.

Laying the Foundation

Conference organizers often invite well-known leaders such as politicians or university presidents to open their meetings. These guest speakers welcome the participants, reinforce the importance of their agenda, and encourage them to do good work together—and then they leave. One of Don Mackel's major objectives was to involve these speakers directly in the symposium's agenda.

UNM President Richard Peck opened the symposium with much more than a passing reference to the topic about to be discussed. "We recognize the need to develop a strategy to fund the replacement of the *utilities infrastructure* that has been ignored for far too long...it has risen to a crisis on our campus amounting to $100 million." He went on to reiterate the critical nature of inattention to deferred maintenance and renewal of buildings as well: In spite of an annual allocation from the state's Building Renewal and Replacement Fund (BRR), it is funded at only about 23 percent of the formula. "We've lost ground," he said. "We now estimate the deferred maintenance backlog, not including primary utilities systems, is in excess of $200 million out of a current total replacement value of $770 million. If left unattended, it will threaten our ability to meet our educational mission. This is a problem not just for the University of New Mexico, or the state, but for all of higher education. It is important to learn from each other, from colleagues all around the

country, and apply the best practices here. I am asking for your help. We've got to get some things done together. If we can find a common approach, this will be a great day!" President Peck clearly articulated the agenda.

Responsibility and accountability was also acknowledged by other opening speakers, including Raymond Sanchez, speaker of the New Mexico House of Representatives. Making no excuses about the competition for resources, Sanchez pointed to recent legislation that provided $16 million from the operating budget toward the renewal problem, and the readiness of the state legislature to look at additional innovative funding methods to maintain buildings and replace the infrastructure. These comments were echoed by members of the Commission on Higher Education, who had played a significant role in voicing the urgency of the CRDM problem among the state's higher education institutions.

What was important, however, was not only the presence of legislative representatives and members of the Commission on Higher Education, but their direct participation in the group discussions. This interaction with the symposium's other participants was a clear indication of their ownership of this agenda as well.

A National Perspective

APPA is a significant resource for information and research on the issues surrounding capital renewal and deferred maintenance. Representing more than 1,800 colleges and universities around the world, its 4,500 members are primarily responsible for managing, planning, and development of campus facilities. Wayne E. Leroy, APPA's recently retired executive vice president, articulated a national perspective on the condition of college and university buildings. Unfortunately, he was not the bearer of good news at the symposium.

APPA's research indicates that the current investment in educational facilities at all levels is estimated at more than $1 trillion. This is the approximate replacement cost of 44,500 educational entities (schools and colleges), whose campuses contain more than 280,000 individual buildings. While these institutions spend $55 billion each year on maintenance, operations, and construction, there is an existing backlog of $200 billion in deferred maintenance and capital renewal.

In *The Decaying American Campus*, APPA identified more than $20 billion of urgent accumulated deferred maintenance in higher education institutions. The updated research cited in *A Foundation to Uphold* in 1996 indicated an increase in this backlog to more than $26 billion—not much progress over an eight-year period.

Currently projected trends will put more pressure on this already overburdened system. Enrollments in higher education institutions, now estimated at 14.5 million, are expected to grow to 16.8 million by 2004—an increase of 16 percent.

Resources continue to be constrained. Tuition costs continue to rise dramatically, but increased support from public funds

and private philanthropy is not guaranteed. Continued pressure from parents, students, and legislators for more accountability are requiring colleges and universities to re-evaluate their performance indicators, find more efficient and effective ways to deliver higher quality educational products, and focus more on outcomes.

Business and industry requirements for an educated workforce have meant greater demand for professional education and skills development. Many companies have joined with colleges and universities to develop curricula, and some have established entire degree-granting programs of their own. Competition from for-profit colleges and universities, such as the immensely successful University of Phoenix, DeVry Institute of Technology, and other proprietary institutions, threaten the enrollment base of more traditional institutions.

And today's educational enterprise is unprepared for the impact of the rapid development of advanced information technologies, which are challenging the learning environment at every level and in every way. The Western Governors' University (involving the participation of more than a dozen states) and the California Virtual University are two examples of state-supported alternative educational delivery models that at their core depend on distance learning technologies. Both of these alternative higher education models have already developed courses and degree programs, and are enrolling hundreds of students in their first virtual classes.

None of these trends are expected to make it easier for states or individual public and private institutions to find the resources necessary to repair broken pipes or replace aging facilities and systems. "Institutions and state legislatures cannot do it alone," said Leroy. "The new millennium will require creative solutions and strategic partnerships among public and private institutions" if these problems are to be seriously addressed.

How Did We Get Here?

Why are our campuses in such poor condition? Has gross mismanagement occurred? What happens to the annual budget for operation and maintenance of the physical plant? Have funds been siphoned off for new construction or other college needs?

Harvey H. Kaiser, president of Harvey H. Kaiser & Associates, consults regularly with colleges and universities, health care systems, government agencies, and corporations. He has written 12 books and more than 40 articles on facilities management, higher education administration, and preservation of historic architecture. A registered architect, he served for more than 20 years as senior vice president for facilities administration and as university architect for Syracuse University. According to Kaiser, the current condition of facilities is due to the compounding of many different factors, which have overwhelmed the ability of the entire educational enterprise to easily correct the problem. Kaiser's report to the symposium participants recounts some of the historical factors:

> Today's higher education buildings, grounds, infrastructure, and fixed equipment—amassed to house and support acad-

emic programs—are the legacy of the dramatic growth of new and existing campuses. More than half of the current campus physical plant was developed after World War II when enrollment grew 400 percent, from 2.7 million to more than 14 million by the mid-1990s. During the same period, the total number of institutions grew from 1,800 to 3,768. New institutions, primarily public two-year colleges, opened at a rate of one every two weeks from 1955 to 1974.

As a result of the rapid expansion, 80 percent of the buildings existing on college campuses today were constructed prior to 1980, and because the bulk of available capital resources was put into new construction, very little was available for older facilities, according to Kaiser's research. Planning new buildings has always been more glamorous than fixing up the old ones, and legislators have been able to point with pride to their role in supporting construction of new laboratories, teaching facilities, and campus development of all kinds.

In this same period, both private and public higher education institutions accelerated their own fundraising campaigns. Where private philanthropy had always been the most important, if not the only, source of funds for new facilities at private colleges, public universities learned that they, too, had the ability to attract gifts from loyal alumni, corporations, and foundations for endowments, scholarships, and buildings. Federal funds became available for research facilities on public and private campuses as well.

While naming new college facilities after generous donors is a traditional practice, there has never been much interest on the part of individual or corporate donors—or the federal government—in giving money to replace sewer systems, chillers, electrical and mechanical systems, roads, or roofs.

In addition, "Buildings developed during this time were not always designed with durability or adaptability in mind," said Kaiser. Partly caused by restrictions of public financing for capital construction and unreasonably short delivery schedules, major renovations, replacement of systems, and other alterations were frequently required much sooner than expected. In the first half of the twentieth century, facilities were designed to be multifunctional (e.g., offices, classrooms, laboratories), but since the 1960s have been designed not only for specific disciplines or programs, but in some cases, for individual faculty or research groups.

Finally, the last several decades have seen a rapid rise in government regulation and changes in building codes.This increase is driven by environmental concerns such as disposal of hazardous materials, issues pertaining to human and animal subjects in research, advances in technology, and the development of stronger, more resilient building materials to increase the resistance to fire and earthquakes.

It would be unjust, therefore, to blame the predicament that colleges and universities find themselves in today on mismanagement. For the most part, facilities managers traditionally have been uninvolved in the planning, design, and programming of new facilities. In fact, they are rarely consulted during the campus development process. They are all too often perceived as superintendents of what is already in place—keeping the

machinery running, the grass cut, the trees trimmed, the grounds and buildings clean. Seldom are their names seen on the rosters of building committees, nor are they invited to participate in meetings with architects and facility planners. And even more rarely are they included in institutional policy making.

Stewardship

"The early alerts to the deferred maintenance problem were heralded in news magazine stories in the late 1970s," Kaiser reported in his remarks to the symposium participants. "The graphic portrayals of scaffold-protected exterior walls, students huddled in overcoats in unheated classrooms, and laboratories with 'closed for repair' signs introduced a new awareness of the issues." Because colleges and universities shared the same problem with cities, counties, and communities everywhere, national attention was focused on the problem, with stories of crumbling bridges, train wrecks, overtaxed utility systems, and major accidents, some resulting in serious injuries and even loss of life.

The federal government began its own studies of the effects of deferred maintenance. Harvey Kaiser has been involved in two such projects: the study of maintenance and repair practices at the Department of Defense, conducted by the General Accounting Office (GAO), and the investigation of techniques for development of maintenance and repair budgets for all federal facilities, coordinated by the National Research Council (NRC). Kaiser shared some of the findings of these studies with the group, including the following key conclusion from a review draft:

> The ownership of real property entails an investment in the present and a commitment to the future. Ownership of facilities by the federal government, or any other entity, represents an obligation that requires not only money to carry out that ownership responsibly, but also vision, resolve, experience, and expertise to ensure that the resources are allocated effectively to sustain that investment. Recognition of these obligations is the essence of stewardship.

Introducing new terminology into the discussion of an old problem is significant. As Kaiser pointed out, phrases such as "deferred maintenance," while accurate, present semantic barriers to policy makers, executives, and legislators. Negative terminology, especially when it suggests failure of management, does not elicit the kind of positive, enthusiastic energy needed for a long-term strategy to address a serious, long-festering problem. Accidents or other crises can result in a quick fix, providing significant amounts of emergency resources. But resources alone will not solve this problem.

The significance of the introduction of the term "stewardship" is its strong association with the long-term financial and facilities planning concepts common to traditional business practices, such as "asset management," "facilities portfolio equilibrium," or "return on investment." All of these terms assume that the comprehensive analysis that underlies these concepts—the costs of facilities ownership—is an important and integral part of determining the cost of doing business.

The public sector of the United States has always viewed capital investment as something completely separate from the resources necessary to continue ongoing

operations. Like states, cities, counties, and the federal government, colleges and universities budget separately for major capital expenditures, especially buildings. Slowly, but almost certainly, these elephantine entities are beginning to realize that facilities are integrally and forever connected to the cost of ongoing operations. The challenge is determining how to calculate the costs of facilities ownership, how to plan for them, and how to pay for them. ■

Chapter 3—
A Common Vocabulary

The daily use of jargon and acronyms is common in all organizations and institutions. Our ability to understand one another largely depends on our mastery of language and interpretation of the expressions used in the course of daily communication.

The terms used to describe issues and cost factors that affect facilities management are not universally understood or consistently applied, particularly by those who are not directly involved in this area. But even facilities professionals have found it difficult to develop a common language.

In 1996, for example, the Arizona Board of Regents established a structure for the review of capital projects and the processes for establishing criteria for new projects and remodeling. Facilities managers from the three state universities met with board members to agree on definitions of terms that would be applied consistently among institutions.

And in 1997, the University of California (UC) began developing a model for predicting capital renewal and deferred maintenance needs for its nine campuses. A task force of 16 representatives from five campuses, the UC president's office, and two independent consulting firms was organized to oversee the project, estimated to require 18 months to complete. During the first five months, the task force met two full days a month, primarily to agree on basic terminology, definitions, and how they would be applied. Their work products became part of the essential framework in developing the model assumptions that would be applied throughout the university system.

Developing a common vocabulary, however, means more than establishing basic terms and their definitions. It also requires a common and consistent understanding of the measurement indicators that are used to determine costs, and the standards against which costs and other indicators can be compared.

The following terms and applications are based on a review of the national studies referenced in this book, specific university projects that have developed planning models, and the presentations at the New Mexico symposium.

Key Definitions

■ Operations and Maintenance

Activities required for ongoing, routine operations and maintenance of a building.

Operations and maintenance activities include the labor and material costs necessary for regular and preventive maintenance of a building and its basic systems or utilities (e.g., roof, electrical and mechanical systems, floors and ceilings and walls, plumbing, elevators, fire alarms), for grounds (e.g., landscape, roads, and pathways), and for infrastructure (e.g., central plant, electrical distribution, water and sewer systems).

Definitions

■ Capital Renewal

Cyclic reinvestment in capital assets that extend the useful life and retain usable condition.

■ Deferred Maintenance

Maintenance work deferred on a planned or unplanned basis to a future budget cycle or postponed until funds are available.

(Excerpted from Harvey H. Kaiser presentation, April 9, 1998)

■ Deferred Maintenance

Work that has been deferred on a planned or unplanned basis due to lack of funds in an annual budget cycle.

Routine maintenance, renewal, and/or replacement of building systems or portions of systems (or elements of grounds and infrastructure) that are not regularly maintained will create a deferred maintenance backlog.

In recognition of this large backlog at most colleges and universities, many institutions provide funds to supplement the annual operations and maintenance budget, allocated for the express purpose of reducing the deferred maintenance backlog. These funds are used for various high-priority items that have been deferred too long or could not be funded with annual operations and maintenance funds. High priority items might include projects such as major repairs or replacement of obsolete systems, roof replacement, elimination of hazardous conditions, upgrades required for code compliance, or projects to conserve energy.

■ Capital Renewal

The systematic replacement of building and utility systems to extend their useful life.

All systems, or parts of systems, are assumed to have a useful life, after which they must be replaced completely. This is true even if they are maintained regularly. While neglected maintenance—or a significant deferral of maintenance—will most assuredly reduce the expected life of a given system, careful and regular maintenance may, in fact, extend its useful life as well.

While it may be next to impossible to predict the exact lifespan of a system, regular preventive maintenance may help achieve or exceed its maximum useful life. For this reason, many privately funded buildings, particularly those financed through bonds or other lending agencies, often require the budgeting of annual replacement or renewal funds over and above normal operations and maintenance and debt service as a requirement for funding approval. Unfortunately, with the exception of some housing and other facilities constructed for auxiliary enterprises on college campuses, this has not been a common practice for most university facilities.

■ Capital Improvements and/or Alterations

The addition or expansion of facilities or work performed to change the interior alignment of space or other physical characteristics of an existing facility so that it

can be used more effectively, or adapted for a new use.

Projects that change the designed use of a facility are generally labeled capital improvements, although some institutions call them "alterations" if they occur in existing space. They are "major capital improvements" if they exceed a specified cost or require higher levels of approval, depending on institutional policy. Some universities, for example, may delegate authority to campus administrators to approve "minor capital improvements" that cost under $500,000, while projects exceeding that amount are designated major capital improvements and require approval of the Board of Trustees or Regents.

Each institution may have a different definition of what constitutes minor and major capital projects. New buildings are almost always categorized as major capital improvements (unless they are very small, such as out buildings), and most institutions budget separately for capital improvements on a project-by-project basis, justified by specific needs criteria and on the availability of funds.

Whether they involve new or renovated facilities, capital improvement projects may require construction related to regulatory and code compliance, seismic retrofits, and/or the recycling of entire buildings for new uses. Some institutions, however, permit funds budgeted for major repairs or renewal—even deferred maintenance—to be used as part of the funding package for capital improvements. This makes sense, for instance, if part of the program requirement to provide space for a new use involves the need to upgrade or replace portions of a building.

■ Life Cycles

Most colleges and universities design their facilities to last a long time. For some, that period is in the range of 30 to 40 years; for others, it may be much longer. California's state universities expect a useful life of 50 years or more. Although very few buildings are originally designed to last much longer than this, hundreds of buildings on older university campuses have existed for 100 or more years, even though their uses may have changed.

Buildings contain many separate, but interrelated, components or systems. They include structural elements such as walls, floors, roofs, and foundations, in addition to mechanical, electrical, plumbing, heating, and air conditioning systems. Each of these systems has an individual life cycle—the service life over

Life Cycle Factors

- Age
- Climate and location
- Quality of original construction
- Use and abuse
- Natural factors
- Level of investment

(Excerpted from Harvey H. Kaiser presentation, April 9, 1998)

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which it is expected to provide adequate performance, measured against a predetermined standard set by the manufacturer or industry association.

Even the predicted life cycle of a system or subsystem will vary depending on the construction materials, the location and climate, intensity of use, and preventive maintenance schedule. In addition to age, wear and tear from unforeseen conditions can substantially and quickly reduce a system's useful life. Buildings are subjected to many variable conditions, so determining a system's life cycle is always an educated guess.

■ Current Replacement Value (CRV)

The actual cost of replacing facilities.

Simply stated, CRV is the average cost per outside gross square foot of buildings, multiplied by the total square feet. It is important, however, to define assumptions on which the numbers are based. A few rules of thumb:

- It is reasonable to add an additional 25 percent to the calculation to account for infrastructure costs.
- Actual costs are usually reported as the estimated cost of construction, exclusive of soft costs (fees, plans, testing, administration, etc), and may or may not include fixed or movable equipment.

Benchmarks

A benchmark standard of excellence or achievement against which similar things can be measured or judged, or any reference or standard by which others can be measured. Benchmarks are important because they provide a basis for comparative analysis and for developing a common vocabulary. APPA-sponsored studies and other research on institutional facilities around the country have resulted in the development of many useful benchmarks to assist institutions in evaluating the condition of their facilities. The following are among the most common:

- *Facilities Condition Index (FCI)* measures the ratio of deferred maintenance to CRV, usually estimated for all buildings on a college campus. Buildings in "good" condition should be expected to have a FCI of 0.05 or less, meaning that 5 percent of the facilities or less are in an *unsatisfactory* condition. A desirable FCI goal is 0.02. Thus, campus buildings that have a CRV of $100 million should be pleased with a FCI of $2 million or less.

Facilities Condition Index

$$\text{FCI} = \frac{\text{Deferred Maintenance}}{\text{Current Replacement Value}}$$

(Excerpted from Harvey H. Kaiser presentation, April 9, 1998)

- *Deferred Maintenance Ratio (DMR)* indicates an institution's capacity to fund the reduction of deferred maintenance backlogs from operating budgets available. The 1994 study of the financial condition of colleges described in *A Foundation to Uphold* indicated that the average DMR for all

Deferred Maintenance Ratio

$$\text{DMR} = \frac{\text{Deferred Maintenance}}{\text{Current Fund Expenditures}}$$

(Excerpted from Harvey H. Kaiser presentation, April 9, 1998)

institutions surveyed was 11.5 percent. This figure is the ratio of deferred maintenance to a college's total budget for education and general expenses. The lower the ratio, the better. In the same study, in which schools were sorted by institutional classification, medical colleges had the lowest DMR, at an average of 4.0 percent. The highest DMR ratio was 18.0 percent, at master's degree-granting state universities. Thus, if the funds allocated for deferred maintenance are lower than the DMR ratio, external resources may be needed to address the problem.

Standards

In the context of this discussion, the term "standards" is used to mean performance criteria for the application of benchmarks to the condition of any given college or university's campus facilities. Defining and understanding the standards for evaluating college facilities is critical to the development of consistent and comparable recommendations for developing funding strategies and allocating resources. Standards are also useful in the development of a common vocabulary.

Val Peterson, director of facilities management at Arizona State University (ASU), pointed out that facility design and maintenance standards established for university buildings are much different than those for commercial, retail, or industrial buildings. "Businesses and industries come and go," said Peterson, "but institutions of higher education are typically around for a long, long time." This certainly does not imply that commercial facilities are designed with less concern for durability, environmental conditions, safety, or other factors. However, the design and maintenance standards for those facilities are based on their special requirements and expected uses over a predicted useful lifespan, factors that may differ from those of most university buildings. In general, however, college and university facilities are expected to have a much longer life cycle than commercial or industrial buildings.

But even within a campus, building design and maintenance standards will be different. University hospitals will require different standards than residence halls; performing arts centers and athletic venues will have different standards than libraries; and laboratories will be treated differently than offices and classrooms. However, there are standards that may apply to all of them; for example, energy conservation, fire codes, and durability of building materials (floor, walls, fixed seating, cabinets, etc.). The specific design criteria, expected useful life of systems, and other factors that will be applied to any given structural element of a facility will be different on every campus and in every region of the country.

Other factors that should be considered when developing standards include:

- how costs are calculated;
- hours of operation;
- intensity of use;
- reserve requirements to support financing, or specific fund sources;
- legislative or policy issues; and
- community and environmental issues that impact design or maintenance.

The Facilities Audit

"There is no substitute for conducting facilities condition audits," said Val Peterson in his report of Arizona State University's successful capital renewal planning process, begun in 1996. Their audit was "necessary to convince legislators about the magnitude of the problems and what it would take to fix them."

The data collected in a detailed assessment of the building conditions on a college campus, combined with a comprehensive data analysis, becomes a valuable part of the common vocabulary. Credible data collection and analysis is integral to the language that facilities administrators use to clearly communicate the nature and implications of problems to the financial officers and budget policy makers. While administrators agree on the need for periodic facilities audits, there are opposing views on how to conduct them.

At the University of Colorado, a comprehensive facilities audit has been underway for three years. John Bruning, director of facilities management, reported that they have "identified $100 million of deferred maintenance backlog." However, "the audit process and our models have enabled us to increase annual funding for deferred maintenance by almost $6 million per year."

In 1986, the state of Arizona passed legislation requiring all facilities to be inspected on a three-year cycle. Arizona State decided to survey one-third of its campus facilities each year, organizing and training in-house teams to complete the audits. The methodology developed at ASU was intended to ensure coordination and uniformity of the collection process and data gathered.

In 1983, Brigham Young University (BYU) conducted a comprehensive audit of all on- and off-campus facilities. The audit was a direct result of the BYU Board of Trustees' decision that the development of a long-term approach for capital replacements and maintenance should be based on actual data, not formulas.

Stanford University developed a model (described in Chapter 4) to predict CRDM needs in 1980, based in large part on sampling data rather than a comprehensive audit. However, in 1994 a consulting firm was retained to survey 160 campus buildings—about half of the buildings in the academic core of the campus. The results of the study not only confirmed the validity of the model's predicted cost of CRDM needs, but provided sufficiently credible information to convince the Stanford trustees to provide $40 million over a five-year period to correct deficiencies and reduce the backlog.

The University of California (UC) system has relied upon the Stanford approach in

developing its own model for capital renewal, initiated in 1997. Of its nine campuses, UC-Davis had made the most progress, completing a detailed audit of 100 of its buildings—about 25 percent of its total campus space—and other UC campuses have audited specific buildings. As described in Chapter 4, UC's database has incorporated the available audit data, augmented by a detailed analysis of actual project costs for replacing facility subsystems on every campus, to derive the cost basis and capital renewal requirements for their model. Using this data and the clearly articulated assumptions developed in the first of three model development phases, UC administrators obtained approval of more than $60 million in additional funding from the UC Board of Regents to alleviate the deferred maintenance backlog and capital renewal for all nine campuses, beginning in July 1998.

Standard and consistent approaches to conducting audits are important tests of their validity. This includes such factors as evaluation criteria, methodology for cost estimates, and treatment of soft costs. Lessons from the audit processes discussed at the symposium include:

- Audits must involve a *systematic* evaluation of buildings, mechanical systems, exterior cladding, utility systems, landscaping, parking structures, and other specific components.

- Ongoing audits are not practical and too expensive. (The University of California estimated the cost of a detailed audit at 10-15 cents per square foot, depending on the scope of work.) Once a comprehensive database is developed, however, regular updates, audits of individual buildings, and/or other sampling techniques can be useful to validate the original data.

- Outside consultants, with experience in evaluating building systems (e.g., structural, electrical, mechanical, plumbing) will probably be needed either to conduct the audit or to assist in-house staff.

- Audits may exclude buildings planned for major renovation, replacement, or significant program changes. The cost of the project will likely include renewal or replacement of components that otherwise would have to be completed as part of a deferred maintenance program.

And, perhaps the most important lesson, according to Chris Christofferson, director of facilities operations at Stanford: "If you haven't audited your campus, you need to do it. You can't manage what you haven't measured, and you won't be in a position to ask for money unless you have good data." ■

Chapter 4—
Planning Models

How many accidents does it take for a city to authorize a traffic signal at a dangerous intersection? Why are seismic codes changed *after* the latest major earthquake, or building codes modified *after* disasters have already occurred? Part of the answer, of course, is that each new experience—even a crisis—provides data for research that enables us to prevent or reduce the impact of future disasters. Another part of the answer is that it usually takes a crisis to make change happen.

And so it is with the problem of capital renewal and deferred maintenance. A major power failure in the campus arena during an intercollegiate basketball game will most assuredly result in emergency funds to upgrade electrical capacity in the arena. But will the crisis create enough interest—and the resources—to upgrade an equally antiquated system for the rest of the campus? Will the crowd of residents who show up at the city council meeting complaining about the accident-prone intersection generate enough interest to support a badly needed traffic management system for the entire community? Probably not.

While a crisis usually gets a lot of visibility in the short run, the solution may only be a bandage on the underlying problem that caused it in the first place. Good managers hope that well-crafted plans can provide an impetus to generate the resources that will reduce the need for crisis-based decision making.

Planning models are important in the development of a long-term approach to capital renewal and deferred maintenance. Effective models can help policy makers understand the value of proactive strategies for attacking this serious problem, while continuing to maintain a high degree of visibility over the relevant issues. Rather than rely on a review of annually developed "wish lists" of urgent facilities priorities—and the occasional broken pipe crisis—administrators can use models to support and monitor the achievement of critical institutional goals and objectives.

Speakers at the New Mexico Higher Education Symposium agreed on five necessary elements of models developed to forecast CRDM requirements:

1. development of commonly accepted definitions of terms, evaluation factors, and institutional standards;

2. assessment of *existing* needs, based on consistently developed data, including cost estimating methodologies;

3. assessment of *future* needs, using similarly consistent data and defensible methodologies;

Planning models are crucial in the development of a long-term approach to capital renewal and deferred maintenance.

4. alternative funding or financing methodologies; and

5. analysis of costs and benefits of optional strategies.

Two basic types of models were presented and discussed at the symposium. The first model deals primarily with the backlog of deferred maintenance and the impact of alternative funding strategies. The second model provides an analysis of CRDM needs, providing a budget framework for long-term funding. (The References section provides resource information for those who want to adapt these models in their own institutions.)

While these two models are different in their scope and purpose, they have several important characteristics in common:

- The models are excellent communication devices, appealing to executive-level management and policy makers.
- Their focus on financial impacts makes them excellent strategic management tools for both facilities managers and budget officers.
- They are easily adaptable to meet the needs of any institution.
- They are simple to use, requiring no complicated hardware or software.

Deferred Maintenance Funding and Backlog Model

The primary purposes of this model are to describe the implications of a given deferred maintenance backlog and provide a set of assumed funding or capital reinvestment strategies to reduce the backlog over time. First described in *Managing the Facilities Portfolio*, published by NACUBO in 1991, the model was converted into simple Excel spreadsheet formats by the University of Colorado at Boulder in 1995. "They were used successfully to present critical facility indicators and decision support data for facilities funding and reinvestment strategies" to senior management and governing boards, according to the University of Colorado's John Bruning.

The model produces two types of reports. The Backlog Projection measures *projected backlog based on set funding levels.* It demonstrates the impact of any given funding level on the backlog over any number of years. The Backlog Target measures the *funding required to meet a targeted backlog.* It demonstrates the level of annual reinvestments required to reach or maintain an acceptable level of deferred maintenance backlog over a specified period of time. Both reports illustrate the effect of levels of funding and backlog on a key benchmark of facilities condition, the Facilities Condition Index (FCI).

The following key factors are the primary inputs or data elements for both reports produced by the model:

Bn= Backlog for year *n*. Baseline data to estimate the backlog is based on a facilities audit or condition assessment.

Vn= Capital replacement value for year *n*. This number will adjust depending upon size and scope of projects planned over time.

I = *Inflation Rate*—the estimate of average cost of construction over time.

P = *Overall Plant Deterioration*—the rate of overall expected deterioration of the physical plant over time, based on campus design standards. For example, a building designed to last 50 years would be expected to deteriorate 2 percent per year.

D = Rate of deterioration for specific deficiencies. For example, buildings with older roofs may have a higher rate of deterioration due to water damage that penetrates the roof and affect other surfaces within the building, thus accelerating the rate of deterioration for the entire building.

G = *Average Plant Growth*—assumed rate of growth in total campus space.

F = *Planned Funding*—assumed funding levels from various fund sources over time. Because the reports are relatively straightforward Excel spreadsheets, any of the assumptions can easily be adjusted at any time and, of course, will change the results as well. The validity of those results depends entirely on the credibility of the assumptions that are used for each of the input variables. An important part of establishing assumptions credibility at the University of Colorado was the completion of the facilities audit and the Board of Regents' review of audit results and staff recommendations of assumptions. Those assumptions became the framework for future funding levels.

Facilities Renewal Resource Model

The Facilities Renewal Resource Model (FRRM) is the name given to Stanford University's model by the University of California, where it is being adapted for application across UC's nine-campus system. Like the deferred maintenance funding models, the FRRM also projects deferred maintenance backlog; however, it's most important function is to provide the ability to separately analyze and predict capital renewal needs as distinguished from deferred maintenance.

The original version of this model was described in a 1980 article, "Before the Roof Caved In: A Predictive Model for Physical Plant Renewal," by Rick Biedenweg and Robert Hutson at Stanford. The framework for the Stanford "BRCI" model was hammered out by a task force comprised of departmental staff from across the campus, and included financial, planning, and facilities expertise.

The FRRM is a budgeting tool. It is based on the assumption that predictable life cycles exist for capital renewal and replacement, and that the life cycle for any type of facility will directly depend on the life cycles of its separate components or subsystems. Subsystems include roofs, plumbing, electrical systems, heating, ventilation, air conditioning, structural elements, etc. By estimating the cost of replacing subsystems and the cycles in which those replacements should occur, the total annual budget for

reinvestment in facilities can be calculated.

While the analysis of subsystem costs and life cycles within various types of facilities is important to the framework of this model, the FRRM has at least two other significant characteristics. It is a statistical model, based on a set of clearly articulated assumptions, and it can be used as a planning or budgeting tool for any campus segment, including groups of facilities, an individual building, or the campus infrastructure.

As a statistical model, the FRRM does not rely on a comprehensive facilities audit for its baseline needs and costs. At Stanford, for instance, the 1980 application of the model projected a cumulative increase of $48.8 million in expected deferred maintenance for the ten-year period 1984-1994. In 1994, an independent audit of the same facilities was conducted to test the model's validity, resulting in an actual deferred maintenance backlog of $47.9 million for the same ten-year period.

While these results seem astonishingly accurate (even to the model's authors), the approach clearly provides policy makers with a credible forecasting tool for long- and short-term budgeting. This would be true even with a much larger variance—say, 10 to 20 percent instead of only 2 percent.

Figure 1 from Stanford's 1980 study illustrates the application of the model more clearly. The top line of the graph is the level of predicted capital renewal needs for the ten-year period. The bottom line represents actual expenditures on facilities renewal during the same period. The difference between these lines is the gray-shaded area, which represents the increase in deferred maintenance needs.

This difference can also be expressed by a relatively simple formula:

Key Features of the FRRM Model

■ Facility Subsystems

The quantity and type of installed subsystems (such as plumbing and electrical) within a facility will determine future requirement.

■ Facility Type

The type of subsystem and its associated costs will vary with different types of facilities.

■ Subsystem Life Cycle

The predictable life of a subsystem will determine when future replacements will be necessary.

■ Subsystem Cost

The replacement cost of a subsystem is influenced by the functional use of facility and the unit costs of subsystem components (e.g., mechanical systems in a research lab are more expensive to replace than those in a classroom facility).

■ Age of Building

The time when replacements will be necessary is determined by the age of a facility and the date of previous repairs.

Facilities Renewal Needs (over x years) - Actual Renewal Expenditures (over x years) = Increase in Deferred Maintenance

Chris Christofferson of Stanford points out that two of the most important conclusions of this analysis can be clearly demonstrated:

1. If renewal is postponed, or not addressed at all, it becomes deferred maintenance.

2. Even if the backlog of deferred maintenance is completely eliminated, it will accumulate again unless annual funding is provided to include predicted renewal costs.

In addition, the model's application as a communication device for high-level management decisions was validated at Stanford. In 1994, the Stanford Board of Trustees approved an allocation of $40 million over five years to address the university's CRDM backlog, and initiated a three-year program of incremental increases to the facilities base budget of $2 million per year. As Christofferson explained, this latter commitment is especially significant because it emphasizes the need for facilities management budgets to include provision of a reserve for the renewal needs of planned new facilities.

The UC Experience

The University of California experience with the FRRM is particularly instructive because the characteristics of such a large multicampus public university can be found in many other types of institutions. Ron Hicks, director of facilities management and construction for the UC Office of the President, has played a leading role in the development of a planning process that could allow UC's nine-campus system to use the Stanford model.

In California, as in most other states, facilities budgets have not provided for predictable renewal needs. While the state legislature has acknowledged a growing deferred maintenance backlog over the years, funding has always been limited to a small fraction of the actual need. Deferred maintenance needs are identified through annual priority lists of from individual campuses. These lists are not consistently prepared, nor are they based on a comparative rationale.

Moreover, the very size and complexity of the UC system has constrained the ability of administrators and planners to get their arms around the problem.

BRCI (1980)
Prediction of Facility Renewal Needs
(in 1994 dollars)

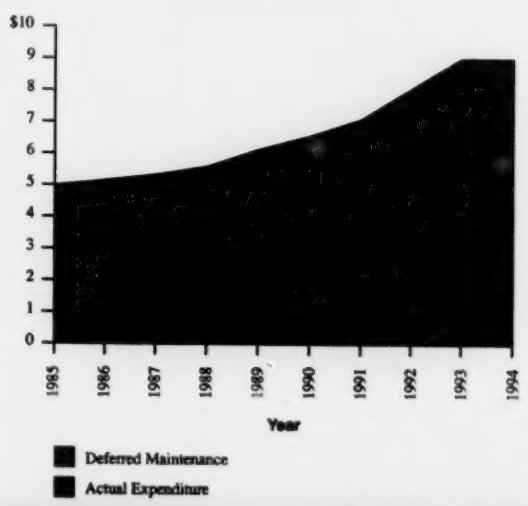

Figure 1

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Building Subsystems

1. Roofing
2. Building exteriors, doors, windows
3. Elevators and conveyor systems
4. HVAC equipment/controls
5. HVAC distribution systems
6. Electrical equipment
7. Plumbing fixtures
8. Fire protection
9. Built-in equipment
10. Interiors: walls, floors, doors, paint

(Excerpted from C. Ronald Hicks presentation, April 9, 1998)

Figure 2

Convincing legislators and campus managers to buy into allocation formulas (e.g., 2 to 3 percent of Current Replacement Value) is difficult, and conducting comprehensive audits is impractical. UC has in excess of 80 million square feet of space, of which about 52 million gross square feet is in core academic buildings. At an estimated 10-15 cents per square foot, it would cost in excess of $6 million for a single audit, which would take several years to complete. In addition, the campuses have not agreed on how to approach or define the elements or requirements for an audit. A budget model—particularly if based on credible assumptions, including cost methodology, common definitions of elements to be included, and recognition of differences among campuses—would be easier to accomplish and considerably less expensive.

In the summer of 1997, Ron Hicks and Trudis Heinecke, director of long-range planning for the UC system, organized a planning process designed to accomplish four objectives:

- to develop a predictive budget model for facilities renewal;
- to project the existing deferred maintenance backlog;
- to produce consistent and comparative data among campuses; and
- to provide a basis for long-term funding.

UC's version of the Stanford model uses the same basic menu of carefully defined subsystems, summarized in Figure 2. The

Building Types

- **Complex Utility Systems:** wet laboratories, high-energy physics, complicated HVAC and gases, etc.
- **Basic Utility Systems:** offices, classrooms, libraries, dry labs, etc.
- **Small Facilities:** aggregated together by complex or basic building systems

(Excerpted from C. Ronald Hicks presentation, April 9, 1998)

Figure 3

Infrastructure Categories

- **Utilities Distribution:** power, water, steam, gas
- **Central Facilities:** HVAC equipment, power generation, electrical substations
- **Roads:** primary, secondary, service, bikeways
- **Landscape/Hardscape:** courtyards, maintained landscape
- **Water:** wells, treatment, storage, reclamation

(Excerpted from C. Ronald Hicks presentation, April 9, 1998)

Figure 4

two primary building types, basic and complex, have been augmented by a third, small buildings, due to the large number of these on UC campuses (Figure 3). To facilitate analysis, small buildings—less than 20,000 gross square feet—are aggregated together for each campus.

Estimated life cycles and renewal costs per square foot of buildings for subsystems within the three building types are provided by the model. The baseline data used to determine estimated life cycles and costs was derived from analysis of multiple information sources, including published survey data such as R.S. Means; actual costs of replacing subsystems in recently completed projects on each of the campuses; facilities audit results from specific buildings or groups of buildings; the Stanford experience; and comparative analyses by independent cost-estimating firms.

The UC model also accounts for special conditions, such as historic buildings, buildings subject to very restrictive building codes (primarily hospital and clinic facilities), and seawater systems. Relative differences in campus conditions that affect renewal costs, such as access by contractors, high-rise conditions, and parking and staging conditions, are factored into the model as well.

Finally, the FRRM addresses infrastructure (including utilities) renewal requirements as well. Infrastructure categories are identified in Figure 4, and the methodology for calculating their renewal needs is summarized in Figure 5.

Credibility of the Process

"The process is more important than the numbers we come up with," reported

Infrastructure Framework

- Measure total "quantity" in each category
- Establish life cycles and unit replacement costs
- Calculate annual funding needed for each category by dividing total replacement cost by life cycle

(Excerpted from C. Ronald Hicks presentation, April 9, 1998)

Figure 5

Hicks in his summary of the key benefits of UC's predictive model. A carefully designed process results in "buy-in and understanding (of all assumptions and data) by representatives of constituent groups," said Hicks. It was important for campus representatives to understand how budget and policy makers would recognize differences among them, including basic terminology.

While it is also useful for stakeholders to understand how a planning model will be used to justify and allocate funds, this should not be facilities managers' primary focus. According to Douglas K. Christensen, director of capital needs analysis at Brigham Young University, "The critical lesson we learned from our 1983 study...is that **we were focusing on money instead of needs.** We were trying to outguess [the] administration on how much money we'd get....**It's better to argue for needs and let administrators determine how to fund them.**".

The most important value of planning models is their ability *to project and to rationalize* deferred maintenance and capital renewal needs. While they cannot help administrators determine how to pay for those needs, they do provide very credible support for a variety of funding strategies.

The process for developing planning models forces facilities managers and budget directors alike to analyze objectively the detailed elements of this critical problem. Modeling provides a mechanism for preventive risk management. Instead of reliance on "wish lists" developed to target specific funding opportunities, or on anecdotal reports of major crises resulting from broken pipes, blown electrical circuitry, or even serious injury, planning models provide facilities managers with an effective tool for long-range budget and resource planning. ■

Chapter 5—
Financing Capital Renewal

It all comes down to money. No matter how big the crisis, how convincing the argument, or how effective the justification of needs in a planning model, it all comes down to the issue of how to pay for capital renewal and a burgeoning deferred maintenance backlog.

The exact nature and scope of the need for resources must be conveyed to those who have the authority to write checks. These individuals are typically budget directors or chief financial officers, but they may also be presidents or CEOs, legislators, trustees, or regents. As a group, they do not understand—nor can they be expected to understand—the "subtleties" of facilities management operations. This might include, for example, the differences in life cycle or costs of copper and galvanized pipes, the intrinsic quality of stainless steel fixtures, or the advantages of various exterior or interior finishes. What they do understand, however, is the impact on the academic programs (and, inevitably, the budget) if a boiler shutdown or a power failure causes a building evacuation for any length of time.

Unfortunately, the all-too-common perception of fiscal officers about deferred maintenance is that it is partly caused by neglect or poor management. Without blaming a particular person or organization, they sometimes wonder if funds allocated for maintenance may have been used for remodeling a professor's lab, planting a garden next to the administration building, or renovating the visiting team locker room in the football stadium. After all, some kinds of maintenance can be deferred without impacting the quality of ongoing operations or programs, can't they?

Fiscal officers also harbor the misconception that if they can find a big enough chunk of money to eliminate the deferred maintenance backlog, they can focus on other issues. And, of course, the vocabulary of facilities management is both unclear and inconsistently used. To understand the difference between deferred maintenance and capital renewal is difficult when the terms are used interchangeably by facilities managers themselves.

Reducing a problem to its simplest terms makes it easier for financial officers to develop funding or financing strategies. They ask three key questions:

- What is the problem, and how persistent is it?
- How much will it cost to fix the problem?

Fiscal officers harbor the misconception that if they can find enough money to eliminate the deferred maintenance backlog, they can focus on other issues.

- How accurate can these costs be predicted over time?

Money managers also prefer to allocate resources based on simple, easy-to-understand criteria. Unfortunately, this preference tends to result in formula-based budgeting and resource allocation for large institutions and multicampus university systems, sometimes blurring the distinction between individual program and campuswide needs. Interestingly, although financial directors may prefer to distribute funds on a formula basis, they discourage the use of formulas by those who request funds or justify needs.

New Mexico's Building Renewal and Replacement Fund

In New Mexico, the Building Renewal and Replacement (BRR) Fund was established for the primary purpose of paying for capital renewal and deferred maintenance. Needs are determined through an annual review by the Commission on Higher Education (CHE) of project priorities submitted by each of the 25 state-supported colleges and universities and two special schools. Currently, the BRR formula provides resources at 23 percent of the estimated costs, yet it has not addressed utilities or infrastructure needs.

Robert J. Stamm, former chairman of the CHE Facilities Committee, agrees that the state legislature has not done enough to fund CRDM, even though some progress has been made. "Formulas are inadequate," said Stamm at the symposium, "but the BRR is an allocator, not a generator of funds. Institutions have typically given higher priority to new projects, operations, and renovations [rather] than infrastructure—and this sends a mixed message."

Six Funding Strategies

As BYU's Doug Christensen and UC's Ron Hicks emphasized in their remarks at the New Mexico symposium, facilities managers should concentrate on how to clearly define their needs, not figure out how much money they can get. On the other hand, financial officers should be aware of the options available to them. The research and case studies cited by symposium speakers suggest six primary strategies for funding CRDM:

1. Direct Appropriations

The simplest and most straightforward method of funding CRDM is through a direct appropriation or augmentation of funds to current budgets for facilities operations. At Rensselaer Polytechnic Institute, the trustees approved a 1994 plan to invest $10 million per year to eliminate or substantially reduce the deferred maintenance backlog over ten years. In addition to a direct budget augmentation reserved for physical plant renewal, they created a quasi-endowment of $7 million per year with the goal of achieving long-term facilities equilibrium (Adams, 1997, p. 13).

Through a combination of increased appropriations from the general fund and proceeds of a general obligation bond issue authorized by the Oregon state legislature, the Oregon State System of Higher Education (OSSHE) has increased funding for CRDM from $4.8 million to

$24 million per biennium period. These appropriations are specifically for "capital repair and deferred maintenance" (Adams, 1997, p. 23). In addition, the state has agreed to match funds raised in capital campaigns by OSSHE member institutions specifically for renovation of existing buildings.

The University of Colorado's John Bruning reported that the state legislature expects to provide an additional $5.8 million to the university to augment $1.8 million currently earmarked for deferred maintenance. According to Bruning, this is a direct result of the capital reinvestment model developed at Colorado (described in Chapter 4). And, in 1994, Stanford University trustees provided $40 million over five years to address both capital renewal and deferred maintenance—a decision based largely on the credibility of the predictive BRCI model developed there.

2. Bond or Debt Financing

Tax-exempt bonds have traditionally been used to finance new capital projects for many private and public universities. Recently, however, this method has been used to fund CRDM as well. Because bonds are a form of debt financing, sources for paying off the bonds must be identified for each new bond issue. Sources to pay principal and interest on bonds typically have come from general tax revenues, tuition or student fees, or other secure income streams. The Oregon State System of Higher Education bonds, for example, were a general obligation issue requiring authorization of general tax revenues.

Based on a well-conceived plan called UConn 2000 prepared by the University of Connecticut, the state of Connecticut recognized a capital need for the university of almost $1 billion over a ten-year period, of which approximately 40 percent was intended for new buildings, 20 percent for equipment, and the remaining 40 percent for deferred maintenance, renovation and adaptation projects, roads, utilities, and parking (Adams, 1997, p. 4). Funds were raised through a general issue bond authorized by the state treasurer in the name of the university.

An innovative bond program was authorized in 1998 by the University of California Board of Regents. In this case, bonds were used as debt financing to produce more than $80 million over five years for the CRDM needs of their nine campuses, in addition to agricultural field stations throughout the state. A portion of the fees charged to nonresident students is the funding source. The board's approval of university bonds was based on a presentation of the Facilities Renewal Resource Model described in Chapter 4.

3. Special Student Fees

Increasing student fees to pay for anything, much less deferred maintenance, is strongly opposed by nearly all students. While this is true for both public and private colleges and universities, the issue is especially vexing at public institutions, where students assume that the state is obligated to pay for the construction and maintenance of buildings.

At the University of Michigan, however, Director of Plant Operations Jim

Christenson developed a comprehensive and carefully detailed program to elicit support throughout the university community regarding the condition and importance of facilities renewal. As a result, the university was able to implement a special fee, beginning at $50 per semester. The fee has been increased gradually to its current $185. The fees generate $14 million per year, which enabled the university to eliminate $34 million in CRDM backlog by 1997. "To make it more palatable, the university dedicates a portion of the fee to financial-need scholarships and educates students about its importance through public relations efforts" (Adams, 1997, p. 34). Michigan's Board of Regents have approved other forms of CRDM funding, including a $100 million bond for renovation projects, which are intended to include capital renewal as part of the project scope of work.

Matthew Adams' study of facilities renewal funding strategies published by APPA in 1997 cites eight additional universities that charge building use fees. In many cases, these are temporary fees used to support university bond measures, and will be discontinued when the bonds are fully paid.

4. Reallocation Through Cost Reduction

Many colleges and universities have discovered creative ways to save money through decreasing the cost of utilities, developing new energy-efficient systems, and replacing outdated equipment. Those savings, in turn, have been reallocated to budgets for capital renewal and deferred maintenance. In Louisiana, for example, the state encourages its institutions to develop shared savings contracts which allow them to reallocate savings earned on more efficient systems. Louisiana State University (LSU) has successfully used such contracts to decrease annual utility bills by $3.4 million, a 25 percent reduction. At the same time, its new energy system has expanded capacity by 20 percent (Adams, 1997, p. 5).

5. Maintenance Reserve for New Buildings

LSU has also developed a policy to fund all new construction and major renovation projects at 110 percent of cost to provide for development of a maintenance reserve fund (Adams, 1997, p. 6). While other universities have also implemented this practice, it is somewhat surprising that more of them have not opted to use this approach. Most privately financed projects require reserves for major maintenance, as bond underwriters and banks require minimum budgets for building renewal and replacement of major systems as part of debt financing security. And this practice is also common for funding campus housing, auxiliary enterprises (student unions, bookstores, etc.), hospitals, and clinic facilities on college campuses whenever bonds or other debt-financing techniques are used.

The problem is, of course, that states have not really addressed this issue in public funding of campus buildings, preferring to fund only the basic design and construction costs of facilities. And campus development staffs have not traditionally pushed the idea of asking donors to provide an endowment over and above the

cost of new building construction for major maintenance reserves. However, there is strong indication that this is beginning to change, as the CRDM problem is so large and increasingly visible.

6. Lease/Purchase Financing

Robert McIntire, a director of Koch Financial Corporation, introduced symposium participants to a sixth method of financing capital renewal—the lease/purchase form of "performance contracting." Performance contracting, explained McIntire, "is a method for a building owner to make capital improvements to a facility, finance all associated costs, and have a guarantee that the resulting operational savings will cover the debt service." In short, all forms of internal or external debt financing, including bonds, are types of performance contracts because they they require the ongoing *performance* of a given institution, organization, or specific project to generate the revenue stream necessary to repay the debt.

However, Tax Exempt Lease Purchases are significantly different. Such agreements allow an institution to purchase equipment or property by making regular lease payments, and the payments are made from general funds or operating budgets. No cash down-payments are required, no long-term general debt is created, and there is no requirement for either voter approval or a referendum on student fees. The security interest is the equipment or system that is installed in the building(s). For instance, if the leased equipment generates more efficient use of energy or increased capacity, the resulting savings in energy costs can be used to fund the lease payments. At the end of the lease term, the lessee may be able to purchase the equipment for as little as $1.

Lease/purchase financing has typically been used to buy school buses, computer systems, and modular buildings. However, it is also an attractive option for energy management and other projects that can produce identifiable cost savings.

Competition for Funds

While any one of these funding strategies—or a combination of them—is available to most colleges and universities to fund CRDM, the core problem remains: there just aren't enough resources to take care of all the needs. Capital renewal and deferred maintenance is only one category among many that higher education administrators must address.

The most important lesson from the symposium discussion of CRDM funding strategies is that facilities managers must first be concerned with providing credible information on the character and the costs of capital renewal and deferred maintenance. And, to the extent possible, they should be innovative in identifying options for using their own resources to address the problem, through internal reallocation, cost-savings techniques, and more effective management processes. The more effective and articulate the message is delivered, the more likely a funding solution can be found! ■

Chapter 6—
Perspectives

The symposium in Albuquerque was organized to facilitate interaction among the participants in a variety of formats, including open-ended questions, panel discussions, small group sessions, and discussion of responses to a questionnaire distributed to the participants. In addition, all sessions were videotaped to facilitate documentation and review, and participants received copies of presentation materials as well. These formats provided every individual with an opportunity for addressing issues and concerns.

Invited speakers represented institutions from five states: Arizona, California, Colorado, Utah, and New Mexico. Two international associations were represented: APPA: The Association of Higher Education Facilities Officers (APPA), and the Society for College and University Planning (SCUP). Both of these organizations emphasize facilities planning and management on college campuses in their programs and publications. The speakers and panelists invited to participate in and plan the symposium program were senior college and university administrators, planners, and/or consultants with extensive experience and direct responsibility for wrestling with the topics and issues discussed in Albuquerque.

Within New Mexico, participants included representatives from the state's universities, community colleges, technical and vocational institutes, the Sandia National Laboratories, and the Albuquerque Public Schools. Also included were representatives from the New Mexico Commission on Higher Education, the state legislature, the Department of Finance and Administration, and several private corporations.

One of the most important benefits of the symposium was the opportunity for individuals from a wide variety of educational institutions, and with differing roles in those institutions, to participate in the program. The intersection of divergent viewpoints is where constructive development of meaningful solutions can most easily take place. How are these disparate views similar, and how are they different?

APPA's Wayne Leroy led a panel discussion to find out, asking the following questions:

- What would you do differently on your campus to address the problem of capital renewal?
- What recommendations do you have for funding or financing renewal needs?

Most college campuses look fine, so the public does not see the problem. If the problem is not visible to the public and their legislative representatives, how will they understand the need for resources to fix it?

- What planning process do you think would be most effective in implementing a renewal program?

- What are the most important policy issues needed to implement a comprehensive CRDM program?

A synthesis of the discussion among the Albuquerque panelists and other participants suggests that their perspectives can be loosely grouped into the following four categories:

- the challenge of stewardship;

- the cost of ownership;

- policy and funding implications; and

- the nature of the planning process.

Understanding where and how these areas of concern come together is important in the development of collaborative strategies that can facilitate the ongoing efforts of each stakeholder group and their institutions to address the issues.

The Challenge of Stewardship

> It is the capacity for maintenance which is the best test for the vigor and stamina of a society. Any society can be galvanized for awhile to building something, but the will and the skill to keep things in good repair day-in, day-out are fairly rare (Hoffer, 1969).

This quote by Arizona State University's Val Peterson best describes the challenge of stewardship. Facilities managers frequently express the issues of stewardship through general frustration about *the lack of visibility* of facilities renewal and maintenance issues over other institutional needs, including capital improvements related to program changes and growth.

According to legislators, commission representatives, and most of the symposium speakers, campus administrators—whether they are facilities managers or college presidents—must clearly articulate the importance and priority of facilities renewal and replacement of the campus infrastructure. When members of the legislature or higher education coordinating boards receive conflicting views of priorities from their constituents, it is difficult to choose among them—making it necessary to fall back on resource allocation formulas that try to achieve equity.

Unfortunately, most college campuses look fine, so the public does not see the problem. Students place a high premium on the attractiveness of campuses as they make their college choices, and adjacent communities support the higher visibility of well-manicured lawns, fountains and sculptures, pleasant walkways and plazas, and well-functioning, yet architecturally interesting buildings. As Colorado's John Bruning pointed out, however, "Underneath the surface of red tile roofs and native sandstone veneer exists a growing problem of deferred maintenance"—the unseen but pervasive decay that can do serious damage to the basic mission of the institution if ignored or consistently underfunded.

If the problem is not visible to the public and their legislative representatives, how will they understand the need for resources to fix it? Bill Koelm, representing the Albuquerque Public Schools, put it very succinctly: "We as facilities

managers don't communicate well enough to decision-makers about the nature of the problem, defining terms in language that they can understand. It's our own fault for not making the case better." And Joe Galon, associate director of the physical plant at the New Mexico Institute of Mining and Technology, concurred, stating "Most of our problems are internal. If the legislature always hears that our problem is new building, more capacity, and not infrastructure, they are getting the wrong message."

Costs of Ownership

Colleges and universities traditionally allocate resources and manage funds with so many different labels on them that it is difficult to tell how or if they are related. Fund accounting and management is a financial fact of life because of the restrictions placed on the accounting of resources provided by legislatures, donors, and the federal government to support specific instructional or research programs, or student services, among others.

In addition, operating budgets and capital budgets are kept entirely separate as well. Funds allocated for a particular building project must be tracked separately to understand as well as monitor all related design and construction costs. However, the ongoing maintenance, repair, replacement of major equipment, and other costs related to a building are "hidden" in many other parts of an institution's books. For example, ongoing maintenance costs are usually included in the physical plant budget for an entire campus; some custodial costs may be funded by research contracts and grants; specialized built-in equipment and/or replacement or upgrading of air-handling or electrical systems might be funded as part of capital improvement projects funded through special allocations. And budgets for deferred maintenance may be provided as part of a special annual allocation, determined on the basis of a priority list of urgent projects, but kept separate from regular maintenance budgets.

It is difficult, therefore, to identify the true costs of ownership of campus facilities. Exacerbating the problem further, campus budgets for ongoing maintenance are determined by formulas that ignore the fact that some kinds of buildings are much more expensive to maintain than others. This may be related to basic programs and functions (e.g., laboratories or high-traffic facilities are more expensive to maintain than office space), or to the efficiency of the original design. So it is not surprising that when legislators or trustees receive budget requests that separate new capital projects, deferred maintenance projects, cost-of-living salary increases, or increases in operating support related to increased enrollment, they have difficulty understanding that there is a significant relationship among these requests, and that there may be trade-offs to be evaluated.

How can facilities managers best address this dilemma? Three general principles resulted from the symposium panel discussions and question-and-answer sessions:

1. *Agreement on comparable data is the first step in determining comparable costs related to that data.* A comprehensive definition of facilities condition,

including credible and comparable data for facilities across the campus and among different campuses, must be established and standards and benchmarks developed. As outlined in Chapter 2, it is essential to develop and agree on common terminology and language to be used in communicating capital renewal and deferred maintenance issues.

2. *The costs of predictable renewal and replacement of major building systems should be identified as an integral part of the cost of building ownership.* A major point of emphasis throughout the discussion is that capital renewal is predictable, based upon expected life cycles of a building's basic systems. Taking care of deferred maintenance, or regular maintenance, is only one part of the problem.
3. *CRDM is fundamentally linked to other costs of ownership, and is not a separate problem.* The consideration of new projects, major renovations, or program-related capital improvements should all include the implications of CRDM and ongoing maintenance. Coordination of these projects is essential to understanding, as well as justifying, resources for the full costs of ownership.

Policy and Funding Implications

Studies have shown that more than 60 percent of the buildings on college campuses are more than 40 years old. This, of course, is due to the enormous demand for higher education resulting from the baby boom after World War II, the federal government's significant investment in research, and the growing demand of American industry for highly skilled workers during the 1950s and '60s. While the demand for higher education is stronger than ever, and colleges and universities are preparing for yet another period of significant demand, the need for new buildings to accommodate growth is unclear. Pressures to accommodate demand by increased productivity, to explore alternative educational delivery strategies driven by technology and competition, and to reduce the cost of higher education have all combined to slow down the building boom.

The balance has shifted dramatically from capital needs driven by growth to the need for preservation, renovation, and adaptive reuse of existing college and university facilities. However, neither facilities managers nor campus policy makers can depend on the exigencies of the marketplace—the peaks and valleys of student demand and interest—to determine the availability of resources. The long-term survival of the campus physical environment requires new approaches and sources of funds that are predictable to the extent possible. That will require new policies for long-term planning and financing of all facilities needs, including new projects and capital renewal.

What are the consequences of the aging population of buildings and systems? Systems that have exceeded their useful life will fail. If the CRDM backlogs are not resolved, the viability of campuses to conduct their missions will be determined by the laws of physics rather than by administrative decisions.

Symposium panelists suggested six general recommendations for long-term planning and funding:

1. Programmatic needs should be coordinated with outstanding deferred maintenance and capital renewal requirements as part of the evaluation process for all projects.

2. Project proposals and the resulting design solutions should be integrated. This suggests that updating HVAC, plumbing, electrical wiring, or infrastructure should be addressed as part of the scope of projects involving major renovations. However, the majority of major building renovations are not driven by infrastructure, deferred maintenance, or capital renewal requirements, but by program changes, including technology needs related to teaching or research. Thus, it may be neither practical nor desirable to replace some building systems because they have many more years of expected useful life. What is important, however, is that there is a plan for renewal requirements that is incorporated in the development strategy for new projects and renovation projects.

3. Plans for facilities renewal, infrastructure renewal, and major maintenance requirements should be connected, not isolated, from institutional strategic plans.

4. Policies should be developed that balance the need for new projects against the need for renovations, utility upgrades, and infrastructure improvements. This may require reexamination of the process for evaluating needs, integration of fund sources traditionally separated by function or purpose, and/or revision of priority-setting mechanisms.

5. An institutional "report card" that regularly measures the relative health of the educational enterprise should include an evaluation of the campus CRDM plan status.

6. While statutory or policy requirements for maintenance reserves, or special allocations reserved for capital renewal, would certainly focus resources on CRDM, it is better in the long run to understand the fundamental issues and to educate chancellors, presidents, and others on the need for integrated planning and resource allocation. As Chris Christofferson pointed out, "This goes to the issue of stewardship. A law would be helpful, but that's not how to focus fundamental attention on the problem." And Ron Hicks added that special allocations are problematic "because there are already too many different colors of money. It is better to demand accountability, effective use of resources, and performance measures."

Planning Process

Finally, with regard to the planning process necessary to implement a comprehensive CRDM program, the panelists agreed that three basic elements should be included:

- *Development of consistent data*, in the form of regular surveys, audits, and documentation of issues through pictures or videos that can be used to weave together a story of the serious nature of the problem.

- *An improved method of analyzing data*, including trend analysis, use of mod-

eling techniques such as those described in Chapter 4, and development of criteria for setting priorities. Total needs should be identified and coordinated with the work of those who plan academic programs and conduct institutional research on enrollment trends and curriculum development.

- *Greater participation of stakeholders.* Audits should be conducted by consultants and staff, working together. Building occupants should be encouraged to see problems first-hand in order to understand how the condition of their buildings affects their primary programmatic objectives. And community and business representatives should be invited to participate in site visits and other aspects of the planning process to facilitate their greater understanding of the relationship between "town and gown" and the need for their support. ■

Chapter 7—
Charting A New Course

How can a plan of action emerge from many divergent points of view? Is it realistic to expect significant results from one conference, regardless of the importance of or the interest in the topic? Heading the list of symposium goals and objectives described in Chapter 2 is the *primary* goal: to agree on collaborative strategies to address the problem of deferred maintenance and capital renewal for New Mexico's higher education institutions. The fact is, however, that the goals of those who plan and organize a symposium may not necessarily be the same for those who are invited to attend or participate in the conference.

For example, some people attend conferences because they are curious about the topic. Others attend because their bosses asked them to attend. Still others participate because they want to learn how their peers are handling the issue being discussed. There may even be a few people who attend just because they don't want to be left out. But actually *doing something* about the problem—in this case, capital renewal and deferred maintenance—may not be at the top of their priority list.

In fact, just getting people away from the regular pressures of day-to-day problems to attend any conference is difficult enough; expecting them to take responsibility for moving forward on actions beyond the conference agenda is usually not realistic. Yet, this is not only what the symposium organizers expected, it is exactly what happened.

The Dynamics of Collaboration

What are the critical elements of a conference that can enable a significant portion of more than 100 participants to agree not only on the issues and the goals, but also on action-oriented strategies? The following rise to the surface as the most important factors:

- The participants must have *a common interest in the problem* and a desire to find a solution.
- Understanding the issues and the likely alternatives for resolving them is *important to the successful performance of each person's role* in his or her institution or organization.
- Each participant has the *authority and/or the influence to do something* about the problem within his or her organization or institution.
- *Sufficient information and the tools to make something happen* are provided to each participant as part of the symposium discussion.

The conference's most valuable outcome may be the greater involvement of the individuals who plan, design, and budget for college and university facilities.

- Each participant is given an opportunity to *buy-in and to assume ownership* of both the problem and the possible solutions.

All five of these elements were built into the organization and format of this symposium by Don Mackel and his colleagues, beginning with the invitees. As described in earlier chapters, the key here is the inclusion of representatives from most, if not all, of New Mexico's higher education institutions, who play different roles in those institutions, as well as government agencies, the Commission on Higher Education, and other states and national associations. The divergent roles and multifarious types of institutions ensured that a variety of viewpoints were automatically going to be injected into the program and related discussions.

Earlier chapters described how the presentation of models from other states and university systems addressed the CRDM problem differently, and how their approaches were similar as well. Chapter 6 described how the panel discussions and participant survey results reviewed by UNM's Harvey Chace focused the diverse perspectives of panelists and other participants on the issues that matter most. Armed with the background of a comprehensive discussion of the CRDM problem and the credibility of information and expertise made available, symposium participants faced the challenge of developing strategic initiatives that could work for New Mexico and each of its higher education institutions.

To achieve this objective, participants were preassigned to discussion groups of 10 to 12 persons. These assignments were made to ensure different institutions and roles were represented within each group (i.e., a mix of facility planners, facilities managers, or budget officers from different colleges and universities). Eight groups were formed and asked to self-select a spokesperson and a recorder to address the following four questions:

1. What is the best way to raise the visibility and awareness of the need to address capital renewal and deferred maintenance?

2. What strategy should be explored for reducing the immediate CRDM backlog?

3. What long-term strategy should be explored for reducing or eliminating the need for deferred maintenance?

4. How can your institution or agency effectively collaborate with others to address the issues of capital renewal and deferred maintenance?

Approximately one hour was allowed for the groups to discuss the questions, followed by a brief report from each group's spokesperson. Each group recorder summarized their discussions, and the summary reports were synthesized by the conference facilitator.

Strategic Initiatives

The group discussions resulted in the following 30 suggested strategies:

■ Increased Visibility of CRDM

- Develop a credible process for presenting data and issues.

- Establish a common vocabulary through use of pictures, videos, and consistent use of terminology.
- Invite legislators (and campus and community leaders) to the campus to hold hearings or view problems first-hand.
- Create campus-based seminars to raise awareness and discuss the costs and benefits of CRDM.
- Design stewardship and ownership responsibilities to involve campus leadership.
- Develop a unified presentation on the importance of CRDM and its relationship to the primary educational mission.

■ Short-term Strategies

- Strengthen internal processes.
- Develop prioritized needs assessment, based on facilities audits.
- Develop a clear history of previous funding for CRDM.
- Create a contingency fund for capital renewal in case BRR funding is not increased from its current level of 27 percent of the formula.
- Apply an immediate assessment of 1 to 1.5 percent of CRV to create a funding source for CRDM.
- Convert deferred maintenance to a recurring funding cycle. (It has typically been considered a one-time expense.)
- Train staff in the skills needed to recognize and address CRDM issues.
- Establish statewide standards that are consistently measured among all 25 state institutions.

■ Long-term Strategies

- Make capital renewal part of a long-term budget strategy, integrating needs into strategic plans and five-year budgets.
- Conduct continuous needs assessments.
- Build accountability for stewardship into job descriptions of campus leadership.
- Create standards and flexibility in the designs of new buildings.
- Increase BRR funding to 100 percent of the formula.
- Develop a standard facilities audit process.
- Involve facilities managers in the planning process for new buildings and major renovation projects.
- Convince the legislature to make a long-term commitment to capital renewal.

Collaboration Strategies

- CHE (Commission on Higher Education) agenda items should regularly include discussion and monitoring of progress on CRDM issues.

- The CHE should play a strong role as a facilitator and coordinator for collaborative activities.
- Designate a group representing all 25 institutions to articulate common issues and approaches.
- Look for opportunities to reallocate internal resources.
- Bring groups together through workshops, task forces, or committees to focus on specific strategies.
- Explore partnerships and strategic alliances.
- Conduct annual meetings among institutions to discuss issues and approaches.
- Provide the CHE with common data, a common process, and common standards.

In a follow-up meeting to the symposium, a smaller group of institutional representatives met with CHE staff to determine how to further synthesize and/or organize these strategies into specific initiatives that would produce definitive results as well as the ongoing involvement and participation of stakeholders in the planning process. This discussion resulted in the recommendation of six initiatives:

1. A task force to develop a standard vocabulary, measurement indicators and an audit process.
2. A task force to develop a standard method for measuring needs and conducting facilities audits.
3. A task force to recommend how to incorporate capital renewal needs into the annual budget process.
4. A task force to develop statewide standards for addressing capital renewal needs and/or incorporating them into new building projects.
5. Developing a consistent presentation of issues and data that could be shared among all institutions.
6. Establishing an annual symposium or forum to discuss issues, progress, and ideas.

Developing New Policies

In his opening remarks to symposium participants, Miguel Hidalgo, the CHE's director of capital projects, pointed out that both the commission and the legislature were well aware of the need—and the priority—for New Mexico's higher education institutions to preserve their existing assets. CHE staff had visited each college campus during the past year to better understand its requests for capital project funding, and the commission itself had worked closely with the speaker of the state House of Representatives to sponsor a measure that would specifically support additional funding of infrastructure needs. In addition, CHE had developed a draft statement of policies to guide the consideration of future funding requests for capital needs which was reviewed by institutional representatives and legislative staff.

In the weeks following the symposium, a final version of the policy statement was hammered out and unanimously adopted

by the commission on June 5, 1998. *The Policy for Public Investment in Higher Education Fixed Assets* represents a key commitment on the part of New Mexico to preserve the public investment in its college and university campuses.

A key section of the policy statement reads:

> A central premise of the CHE policy is that campus buildings, infrastructure, and equipment are both assets and liabilities:
>
> - As assets, their value should be protected by sufficient annual investment in their maintenance, renewal, and adaptation.
> - As assets, maximum return on them should be realized in high utilization or, if revenue-producing, dollar return on investment.
> - As liabilities, fixed assets have heating, cooling, cleaning, staffing, maintenance, renewal, and future adaptation costs that must be considered before the assets are acquired.
>
> New buildings create new liabilities, and therefore the costs of renovation must be compared to the costs of new construction in making decisions about fixed assets. Renovated space may be more or less costly than new space, and demolition and replacement may be the best option if a building is no longer functional. But renovation of existing space should be given full consideration before deciding to add new space (New Mexico Commision on Higher Education, 1997).

The policy statement also addresses the impact of technology on the business of higher education, and on educational delivery methods on campus and from remote locations. "Technologies that are and will be available add both opportunity and complexity to fixed asset decision-making....While buildings traditionally go for decades before renewal, technology will require renewal every few years in order to remain current" (New Mexico Commision on Higher Education, 1997, p. 2). With this general preface, the policy statement proposes the following seven principles:

1. Maintenance, renewal, and adaptation of existing fixed assets of New Mexico's colleges and universities should be the first priority of the state as well as at the institutional level.
2. Renovation of existing space should be considered before deciding to add new space.
3. Existing buildings on campus should be fully utilized before investments are made in new buildings on that campus.
4. Thoughtful, long-range planning should guide institutional decisions about the expenditure of public funds for buildings, land, infrastructure, and equipment. Each institution should maintain and periodically update an institutional strategic plan linked to the institution's mission statement. As part of this strategic plan, each institution should maintain and periodically update a long-range facilities plan and a long-range technology plan to guide institutional decisions about requests for public investment in fixed assets for the institution.

5. Alternative models for delivering higher education that consider resource sharing and collaborative initiatives among existing institutions, public schools, government agencies, communities, and the private sector should be given serious consideration prior to requests for additional investment in new fixed assets at New Mexico's colleges and universities.

6. Institutions should fully explore the use of technology to offer distance education, as well as electronic access to courses and programs for students in both on- and off-campus settings.

7. The construction of new buildings to accommodate additional students, new programs, and to meet new technological and scientific needs should occur only after a careful and thorough assessment has shown that renovation or reassignment of current space cannot meet the new needs.

Lessons Learned

The Albuquerque symposium should not be viewed as either the beginning or the end of the planning process. The events that shut down the University of New Mexico for three days did not result in the organization of the symposium, and the new CHE policy statement was not developed solely as a result of the conference, either. Rather, the symposium played a critical role in an already ongoing process, helping to focus collective attention on the CRDM problem at one time and in one place, and in such a way that all the stakeholders could be provided with an opportunity to assume ownership of both the problem and the potential solutions.

Perhaps the most important lessons from the New Mexico Higher Education Symposium are not found in its content or program, nor in the strategic initiatives that emerged from the discussions. For those who recognize the merit of this kind of forum and are considering organizing a similar effort in their own state or institution, or who read and learn from these chapters about the myriad approaches to the CRDM problem and wonder how to apply them, the value of collaborative discussion boils down to a few basic tenets:

- *The collaborative process itself can energize and motivate action, regardless of the outcomes.* An event that brings people of like mind together to focus on a specific problem is frequently sufficient enough to initiate change, regardless of whether there is agreement on the precise nature of the actions needed. Take the case of the University of California's initiative to develop a predictive capital renewal budget model. The UC Regents were sufficiently convinced of the enormity and scope of the CRDM problem to provide a funding mechanism that has provided $80 million over five years for deferred maintenance and capital renewal. This decision was made on the basis of only the first several months of exploration and discussion of issues and common terminology by the task force, before the model was even tested. And the New Mexico Commission on Higher Education approved and sent to the legislature a new policy that guides statewide planning for capital project needs of all kinds—before any of the suggested initiatives had been implemented.

- *There are many paths to reach the same goal.* The purpose of this symposium, or similar forums or conferences, is not to agree on one strategy for tackling a problem, but to provide sufficient information to permit those with responsibility and authority to understand the advantages and disadvantages of various approaches, any combination of which may be used to meet each institution's unique needs.

- *Collaborative strategies are the means by which goals can be achieved—they are not the goals themselves.* The real goal, in this case, is to solve the problem of a growing and critical backlog of neglected facilities. Developing a predictive model is not the goal; conducting a comprehensive facilities audit is not the goal; increasing the funding of the BRR formula in New Mexico to 100 percent is not the goal. These are examples of strategies which, if implemented, would help ensure that New Mexico's colleges and universities could achieve the real goal. It is important to identify the strategies that will enable institutions to reach the goal of addressing the CRDM problem in the quickest, most effective manner.

- *Collective action through the formation of strategic alliances is the most effective way of approaching a problem that crosses institutional and organizational boundaries.* When legislative bodies, boards of regents, or other leadership groups are faced with conflicting priorities, mixed messages, or inconsistent data from constituent groups or stakeholders, they should not be expected to have a clear direction or to set reasonable policies and priorities. The more articulate a message is presented, and the more representative it is of the views of a broad constituent base, the more likely a solution can be found that most will accept.

- *Leadership is required both to form successful collaborations and to implement successful strategies.* Strategic partnerships and alliances, symposiums, and conferences all require significant leadership to plan, organize, and direct appropriate action. Merely converging as a group to discuss issues is not enough, although brainstorming can be an educational and helpful exercise. In the New Mexico situation, leadership has come from a variety of constituent groups, including the University of New Mexico, the CHE, the legislature, and the executives of participating institutions who not only sent representatives to the symposium, but are committed to solving the CRDM problem on their own campuses.

New Mexico's colleges and universities are actively working together—with significant help and energy created during the discussions at the Albuquerque symposium—to address the CRDM problem as effectively as possible, recognizing that this is only one of a myriad of issues facing higher education. The most valuable outcome of this collaborative effort in the long run may be the greater involvement of those who are responsible for the planning, design, and budgeting of college and university facilities. ■

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